



## STATE & PRIVATE FORESTRY FOREST HEALTH PROTECTION SOUTH SIERRA SHARED SERVICE AREA



**Report No. SS16-003**

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**To:** Tribal Council of Tuolumne Band of Me-Wuk Indians  
Gerald Johnson, BIA Regional Forester, Pacific Regional Office  
Michelle Donahue, Environmental Program Manager

**From:** State and Private Forestry, Forest Health Protection, South Sierra Shared Service Area

**Subject:** Update of on-going tree mortality on Tuolumne Band of Me-Wuk Indian Reservation, CA

*On January 28, 2016, Martin MacKenzie (Forest Health Protection, pathologist) revisited areas that had been the focus of the 2015 site visit in the company of William Dutra. This report documents changes observed during this second field visit, and discusses possible management options.*

### **Introduction**

On March 3, 2015, Forest Health Protection (Beverly Bulaon, entomologist and Martin MacKenzie, pathologist) had accompanied Jim Roehl, Bill Dutra, and William Dutra to assess several dead ponderosa pines on Tuolumne Me-Wuk Reservation, Tuolumne, CA. Within a span of two months, Jim had been notified by residents of ponderosa pines suddenly fading in large groups within the reservation. Dead trees were safety hazards for public and property, but there was also concern that more trees would continue to be lost to forest pests as the drought situation continued. Therefore on January 28, 2016, in the company of William Dutra, MacKenzie revisited areas that had been the focus of the 2015 site visit. This report documents changes observed during this second field visit, and discusses possible management options.

### **Location**

Tuolumne Band of Me-Wuk Indian Reservation is about 800 acres that ranges between 1800-2500 feet in elevation, in the Sierra Nevada foothills. An average wet year of rainfall for Tuolumne City is 33 inches, with the occasional snowfall. Forested areas are primarily canyon live oak-grey pine type, with ponderosa pines growing in the upper elevations and wet drainages. Heavy brush cover a large percentage of ground, mainly buck brush and deer brush *Ceanothus*, manzanita, poison oak, or chamise. While tree stocking may not be dense, brush can be as high as 90% cover and as tall as five feet high. Where ponderosa pines are found, basal area component of pine is as little as 50 ft<sup>2</sup>/acre but trees can be fairly large.



**Figure 1.** Dead and fading pines along Turnback Creek drainage, photo taken on March 3, 2015. *Note: Grey pines apparently unscathed by this phase of the drought are marked with arrows. Some of the dead trees seen in figure 1 have already been harvested.*



**Figure 2.** Recently dead and fading ponderosa pines along Turnback Creek drainage, taken on January 28, 2016.

In 2015, bark beetle-killed ponderosa pine trees were found on properties next to Turnback Creek and Me-Wuk Street (see Figure 1). About 10 trees in the general vicinity were noted with recent crown fade, woodpecker flaking on the upper bole, and multiple pitch tubes on the trunk. A small dead pine was noted next to a log deck killed by woodborers rather than bark beetles. Half of the standing pines were of fairly large diameter (>25 inches diameter at breast height) and within falling zones of roads or houses. One large tree was noted with only top-kill, but most likely dead since coloration of the remaining crown was fading. No other tree species was noted as fading or declining in the area.

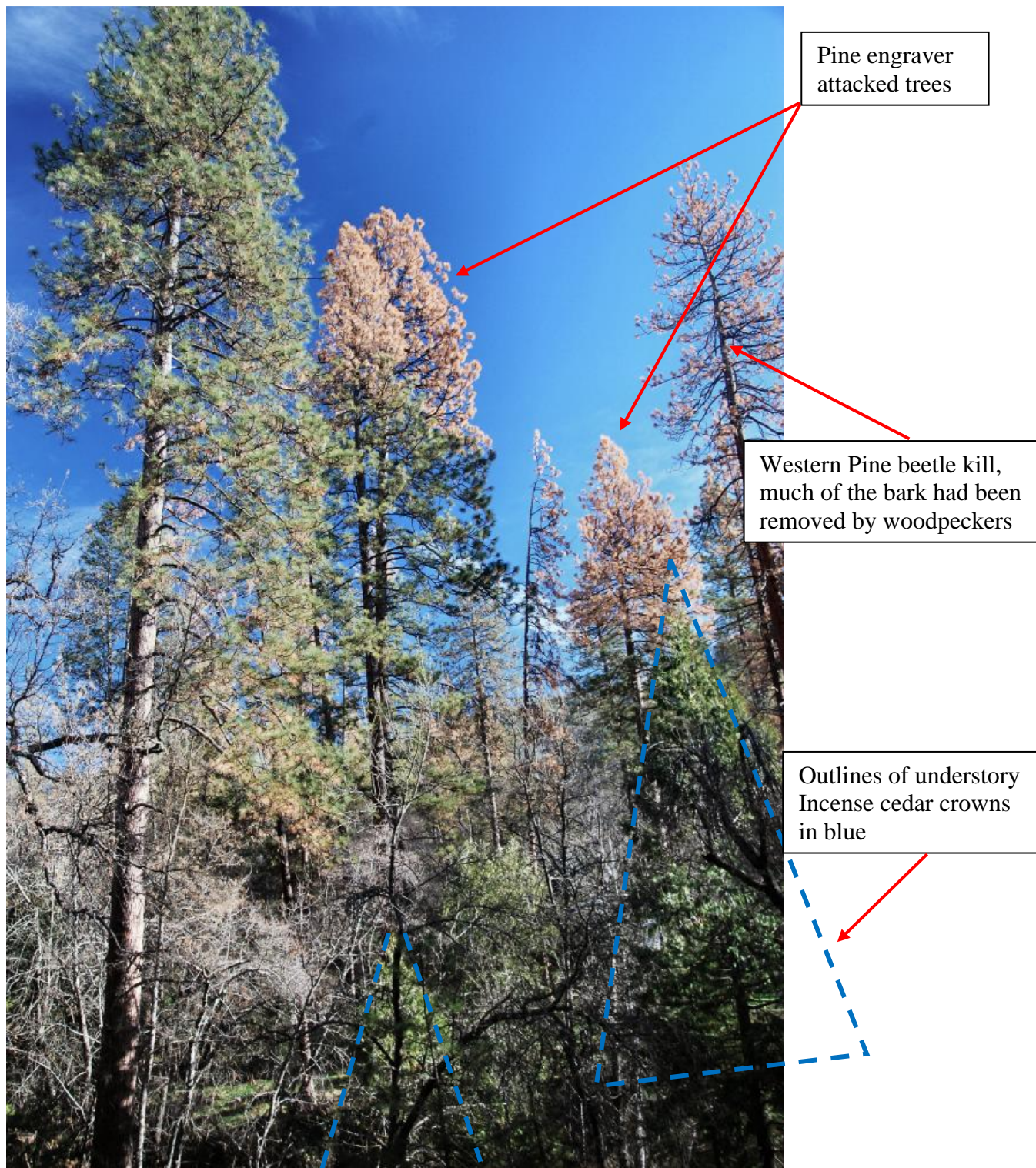
### **Background**

Tuolumne Rancheria Administrative Draft Integrated Resources Management Plan (IRMP) was prepared in 2006 on behalf of the Tuolumne Band of Me-Wuk Indians, for the Bureau of Indian Affairs. In IRMP maps, Turnback Creek is mapped as orange polygons: Ponderosa Pine series. This polygon was specifically identified as a Fuels Treatment Area (IM-O1-3B, page 3-13:

***Turnback Creek:** The area along the creek has experienced an unusual fuel build up and currently would burn with a very high intensity. Having this build up along the only access road to this area could endanger escape routes and limit access for suppression vehicles. Additionally this area provides one of the few good stands of Ponderosa pine along the perennial creek. Both of these are resources that could be damaged by a higher intensity fire.*

Up to and including 2015, grey pines were observed dying in and around Tuolumne County. However, on both of visits, it was remarked that no grey pines were dying in Turnback Creek drainage. Under favorable conditions in the early last century, ponderosa pine may have expanded out from the more mesic areas of the drainage and moved up slope. Despite the current extensive mortality concentrated in ponderosa pine, the ecosystem may be reverting back to more xeric grey pine/ blue oak ecotypes which may be more suitable under current climate conditions (Meyer & Safford, 2010). This would be the blue oak and mixed oak series on Figure 2-2 of the IRMP (see IRMP for further reference). This does not imply that ponderosa pine cannot be maintained on the more mesic sites but revegetation efforts should consider the environmental conditions for pine sustainability on this landscape. Retaining dominant ponderosa pine in the foothills should also encourage retention of black oaks and live oaks plus incense cedar and grey pines as well, to ensure that the ecosystem will be sustainable to long term changes in local climate that may occur in the coming decades.

**Summary of observations.** In 2006, the BIA IRMP cautioned that the fuel loading in Turnback drainage was accumulating due to natural in-growth of vegetation and small disturbances. Natural wildfire has been suppressed for many decades in this drainage to protect the public and property. The current surge of tree mortality has exponentially added to potential fuel loads and significant loss of overstory pine (see Figure 2).



**Figure 3.** An interior view of the polygon of mortality in Figure 2, showing new *Ips* infestations. *Ips* attack (Pine engraver) was not noted on the earlier visit. The crowns of the understory, less impacted, Incense cedars are highlighted in blue. The naked crowns of leafless oaks and other hardwoods are also obvious. Photo taken on February 28, 2016

## Discussion and Management Options

While the recent snow pack at higher elevations of the Sierra Nevada have been above normal, mortality due to bark beetle infestations last year will continue to be observed on the landscape. Until sufficient precipitation occurs for a consecutive number of years, bark beetles will continue to attack and distribute to where hosts are still susceptible and weakened. There are treatment options available for providing short-term protection against beetles, but long-term prevention strategies should be considered to further prevent undesirable levels of mortality if drought conditions persist. It is expected that some bark beetle mortality will continue this year.

There are options available for homeowners than agencies that often have to treat at larger scales than single trees. While some treatments are more effective than others, there are no guarantees that treatments will completely deter invading beetles but rather mitigate potential hazards or mortality.

- **Short-term:**

- Preventative chemicals for *uninfested* trees will stop attacking beetles but must be done **before** beetle flight. Recommended for high-value trees only.
- Removal of *currently-infested* trees will reduce potential hazards but strongly encouraged to combine removals with stand density reduction thinning.
- Deep watering water-stressed trees in the early spring will provide some respite. Prevent mechanical injury during construction, ground disturbance, or soil compaction around high-value trees as this may compromise their root systems.
- Proper treatment is encouraged for green slash to prevent secondary infestations on residual trees (see Appendix B).

- **Long-term:**

- Thinning in dense stands (55-75% basal area of optimal stocking) to reduce resource competition between trees. Maintaining proper stocking for site will greatly enhance individual tree vigor and health.
- Reduction of smaller diameter understory and brush to redistribute limited resources.
- Promotion of diversity in age, structure, or tree species.
- Proper treatment of green slash or currently-infested material away from residual green trees (see Appendix B).

Forest Health Protection encourages the Tuolumne Band of Me-Wuk Indians to work through their environmental science and fire programs to develop strategies that meet the goals of wildfire prevention and improve resilience of the ponderosa series.

Forest Health Protection was happy to assist the Tribal resource group, and can provide more information upon request. There are funding opportunities through Forest Health Protection for long-term bark beetle prevention strategies (Western Bark Beetle Initiative) every fiscal year. If there are any questions concerning this report or about funding opportunities, please do not hesitate to contact us.

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## **References**

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**Furniss, R.L. and V.M. Carolin 1992.** Western Forest Insects. USDA Forest Service, Miscellaneous Publication No. 1339.

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<http://fsweb.r5.fs.fed.us/program/ecology/climate/>

## Appendix A

### Bark Beetle Biology

Western pine beetle (*Dendroctonus brevicomis*, WPB) is a native bark beetle that attacks ponderosa and coulter pines. Adults are 3 to 5 millimeters in size (size of a rice grain), and typically dark brown in color. Emergence of adults to seek new hosts start in the spring as soon as temperatures stay consistently warm (> 60 degrees Fahrenheit) and keep flying until temperatures drop in the fall. While there may be peaks in adult flight times, emergence of beetles can be straggled throughout season. Once trees are selected and mass-attacked, adult pairs construct galleries underneath the bark for brood development. If conditions are favorable, this next generation can develop quickly and emerge after a few months to infest new trees. Identification of infestation is by small reddish-brown pitch tubes scattered along the mid-bole, boring dust found in bark crevices, or woodpeckers flecking the outer bark looking for WPB larvae.

Western Pine beetle is primarily responsible for ponderosa pine mortality but does have associates that help overcome tree defenses. , Currently WPB has an abundance of available hosts due to drought-stress.. Weakened trees are unable to produce enough defensive resin to “pitch out” attacking beetles. Stand conditions that are overcrowded, stagnant, diseased, or recently injured (ex: wildfire) are also attractive to bark beetles. WPB typically favor larger trees for better brood development and protection, but will attack smaller diameters if populations are high. Red turpentine beetles (*Dendroctonus valens*) and woodborers may attack the lower bole where bark is thickest either before, after, or in concurrence with WPB attacks. WPB prefer mid-sections of the bole, leaving the smaller diameter terminals (<6 inches smaller) to pine engravers or woodborers. The combination of multiple attacking pests and drought-stress has resulted in rapid tree decline.

Pine Engraver beetles (*Ips spp.*) are a group of bark beetles that attack multiple pine species. And while these beetles are relatively similar size and color as western pine beetles, they have a wider host preferences. Unlike the western beetles, they prefer to attack small trees less than 10 inches, but will attack larger diameters if conditions are suitable. Often their attacks are limited to terminals of larger trees (see figure 3). This species can breed in logging debris, and populations can build up in slash to the point that they are able to emerge and overwhelm neighboring healthy trees. Frequently lop-and-scatter treatment is used to dry out host material quickly, preventing brood establishment (see appendix A). The gallery patterns of the pine engraver and the western pine beetle are distinctly different and the patterns observed on the bark removed from the logs in image 3 were those of the western pine beetle.

## Appendix B.

### **Recommendations for Proper Slash Treatment**

Below are recommendations to reduce the risk of insect infestation into standing green trees. These recommendations were developed to reduce the likelihood of subsequent attack, and reduce loss beyond acceptable levels. Treatments can be modified to accommodate basic prevention methods for treatment of slash.

- *If possible, schedule treatments AFTER July. Ips species are early fliers, emerging in early spring if temperatures are warm enough, and will quickly infest green slash. If insect activity has been high in neighboring areas, this may be an indication of high populations, but also that area is highly susceptible in its current state.*
- *Material that usually will **not** produce large insect broods: very large logs, lopped material less than 3 inches in diameter, old soured or partially dry slash.*
- *Any method that desiccate or dry out wood to make it unsuitable for brood survival. All stem pieces or large branches are recommended to be cut into 3 foot bolts or smaller. For larger pieces over 6 inches in diameter, additional scarring of the bark or putting singular pieces out in direct and full day sunlight will help with the drying process.*
- *Lopping and scatter is recommended over chipping in the spring, but make sure all pieces are cut to the smallest lengths if possible to accelerate drying. This technique may be a risk for subsequent attack, but if treated properly, losses should be low.*
- *Try and stack piles in full sunlight without shade. For large pieces, put these on the outside of piles rather than inside. If making piles, try and keep them small to accelerate drying. Cover tightly small piles with clear plastic to accelerate drying process.*
- *Larger piles: select locations where the pile can receive full sunlight and is set apart from residual trees. You can place piles amongst non-host species as a buffer. Burning pile in the fall would further reduce risk of further infestation or emergence in the spring. Best to completely remove slash from site.*
- *Slash should also not be created for more than one year in the same location. Make sure efforts are completed during the same year rather than returning the following year to continue. This will increase risk of second year beetles building in the area and overcoming green tree defenses*

Reference: **DeGomez, T., C. Fettig, J.D. McMillan, J.A. Anhold, and C. Hayes 2008.** Managing Slash to minimize colonization of residual trees by Ips and other bark beetle species following thinning in southwestern Ponderosa pine. University of Arizona, Cooperative Extension, Publication AZ1448.